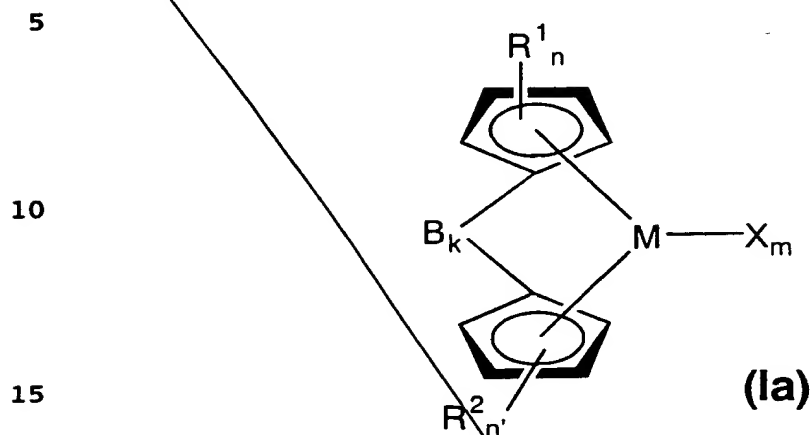


We claim:

1. A process for purifying compounds of the formula (Ia)



where

- 20 M is a metal of transition group III, IV, V or VI of the Periodic Table of the Elements, in particular Ti, Zr or Hf, particularly preferably zirconium,
- 25 R^1 are identical or different and are each a radical SiR_3^{12} , where R^{12} are identical or different and are each a hydrogen atom or a C_1 - C_{40} group, preferably C_1 - C_{20} -alkyl, C_1 - C_{10} -fluoroalkyl, C_1 - C_{10} -alkoxy, C_6 - C_{20} -aryl, C_6 - C_{10} -fluoroaryl, C_6 - C_{10} -aryloxy, C_2 - C_{10} -alkenyl, C_7 - C_{40} -arylalkyl, C_7 - C_{40} -alkylaryl or C_8 - C_{40} -arylalkenyl,
- 30 or R^1 is a C_1 - C_{30} group, preferably C_1 - C_{25} -alkyl such as methyl, ethyl, tert-butyl, cyclohexyl or octyl, C_2 - C_{25} -alkenyl, C_3 - C_{15} -alkylalkenyl, C_6 - C_{24} -aryl, C_5 - C_{24} -heteroaryl, C_7 - C_{30} -arylalkyl, C_7 - C_{30} -alkylaryl, fluorinated C_1 - C_{25} -alkyl, fluorinated C_6 - C_{24} -aryl, fluorinated
- 35 C_7 - C_{30} -arylalkyl, fluorinated C_7 - C_{30} -alkylaryl or C_1 - C_{12} -alkoxy, or two or more radicals R^1 may be joined to one another in such a way that the radicals R^1 and the atoms of the cyclopentadienyl ring which connect them form a C_4 - C_{24} -ring system which may in turn be substituted,
- 40 R^2 are identical or different and are each a radical SiR_3^{12} , where R^{12} are identical or different and are each a hydrogen atom or a C_1 - C_{40} group, preferably C_1 - C_{20} -alkyl, C_1 - C_{10} -fluoroalkyl, C_1 - C_{10} -alkoxy, C_6 - C_{14} -aryl, C_6 - C_{10} -fluoroaryl, C_6 - C_{10} -aryloxy, C_2 - C_{10} -alkenyl, C_7 - C_{40} -arylalkyl, C_7 - C_{40} -alkylaryl or C_8 - C_{40} -arylalkenyl,
- 45

5 or R^2 is a C_1 - C_{30} group, preferably C_1 - C_{25} -alkyl such as methyl, ethyl, tert-butyl, cyclohexyl or octyl, C_2 - C_{25} -alkenyl, C_3 - C_{15} -alkylalkenyl, C_6 - C_{24} -aryl, C_5 - C_{24} -heteroaryl, C_7 - C_{30} -arylalkyl, C_7 - C_{30} -alkylaryl, fluorinated C_1 - C_{25} -alkyl, fluorinated C_6 - C_{24} -aryl, fluorinated C_7 - C_{30} -arylalkyl, fluorinated C_7 - C_{30} -alkylaryl or C_1 - C_{12} -alkoxy,
 10 or two or more radicals R^2 may be joined to one another in such a way that the radicals R^2 and the atoms of the cyclopentadienyl ring which connect them form a C_4 - C_{24} ring system which may in turn be substituted,

X is a halogen atom, in particular chlorine,
 n is from 1 to 5 when $k = 0$, and n is from 0 to 4 when $k = 1$,
 15 n' is from 1 to 5 when $k = 0$, and n' is from 0 to 4 when $k = 1$,
 m is from 1 to 4, preferably 2,
 k is zero or 1, where the metallocene is unbridged when $k = 0$ and is bridged when $k = 1$, with preference being given to $k = 1$, and
 20 B is a bridging structural element between the two cyclopentadienyl rings,

comprising the steps:

25 a) reacting the compound of the formula (Ia) with a ligand exchange component



30 where

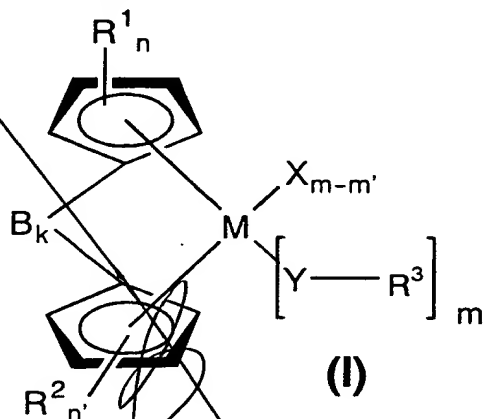
M^1 is a cation or a cationic fragment, in particular Li, Na, K, MgCl, MgBr, MgI, or is an ammonium cation corresponding to an amine,

35 R^3 is hydrogen or a C_1 - C_{40} group, preferably C_1 - C_{25} -alkyl such as methyl, ethyl, tert-butyl, cyclohexyl or octyl, C_2 - C_{25} -alkenyl, C_3 - C_{15} -alkylalkenyl, C_6 - C_{24} -aryl, C_5 - C_{24} -heteroaryl such as pyridyl, furyl or quinolyl, C_7 - C_{30} -arylalkyl, C_7 - C_{30} -alkylaryl, fluorinated
 40 C_1 - C_{25} -alkyl, fluorinated C_6 - C_{24} -aryl, fluorinated C_7 - C_{30} -arylalkyl or fluorinated C_7 - C_{30} -alkylaryl,

43

Y is an element of main group 6 of the Periodic Table of the Elements, in particular oxygen or sulfur, or a fragment CR^3_2 , NR^3 , $\text{NR}^3(\text{CO})-$, $\text{NR}^3(\text{SO}_2)-$, PR^3 or $\text{P}(=\text{O})\text{R}^3$, $\text{O}(\text{CO})-$, $\text{O}(\text{SO}_2)-$,

to form the compound of the formula (I)



where

M , R^1 , R^2 , R^3 , X , Y , n , n' , m , k , B and R^{12} are as defined above and

m' is from 1 to 4, preferably 1 or 2,

with the compound of the formula M^1X , where M^1 and X are as defined above, being eliminated, in an inert solvent or solvent mixture,

- b) if desired, separating off solid residues of the formula M^1X
- c) if desired, separating off the inert solvent or solvent mixture,
- d) recrystallizing the compound of the formula (I) from an aprotic hydrocarbon,
- e) separating the compound of the formula (I) from the mother liquor.

2. A process as claimed in claim 1, wherein a polar or nonpolar, aprotic hydrocarbon or hydrocarbon mixture is used in step d).

3. A process as claimed in claim 1 or 2, wherein toluene, hexane, heptane, xylene, tetrahydrofuran (THF), dimethoxyethane (DME), toluene/THF, heptane/DME or toluene/DME is used in step d).

4. The use of a compound obtained as set forth in claim 1 for preparing a catalyst system for the polymerization of olefins.

sub
AI

5. A catalyst system comprising at least one compound obtained as set forth in claim 1 and a support and, if desired, a cocatalyst.
- 5 6. A process for preparing a polyolefin in the presence of a catalyst system as claimed in claim 5.
7. The use of a catalyst as claimed in claim 5 for the polymerization of one or more olefins.

10

15

20

25

30

35

40

45